

E-Notes

Energy Efficiency Notes

Set-Back Thermostats for Reducing Space Heating Costs

Background

Setting back the room temperature is one of the most effective means of reducing space heating costs in buildings not occupied 24 hours a day. Many commercial and recreational buildings are unoccupied for substantial periods each day. By reducing the temperature of the building for the unoccupied hours, substantial energy can be saved.

Figure 1. Programmable Set-back thermostat

Temperature set-back can be done either by manually adjusting the thermostat or by using a programmable (sometimes called a clock) thermostat. The programmable thermostats work best where there is a regular pattern of activity in the building. Many buildings have a regular week-day and a regular week-end schedule.

Savings from Set-back

On an annual basis in the climate of Southern Saskatchewan (Regina-Saskatoon), the savings from night set-back can be substantial. For example, if the building temperature is set back 5 degrees C for 12 hours each day, the annual savings on heating cost would be about 8%. Increasing the hours of setback, or further reducing the room temperature, will improve the annual savings.

If the thermostats are manually adjusted each day for set-back, there is no capital cost involved. Residential quality programmable thermostats with 7 day programs (weekdays and weekends) are available for about \$75. For commercial buildings, more elaborate energy management systems are available.

In almost all buildings, the cost of the set-back thermostats will be repaid in less than a year if the thermostats are properly installed, programmed, and maintained.

Points to watch

1. All staff must be made aware of the fact that the night set-back thermostat is in operation, and their help sought in implementing the use of set-back. Without the co-operation of staff, this energy saving measure will fail.
2. A means of readily increasing the temperature in the building must be known to most staff.
3. In buildings with leaky or poorly insulated walls and ceilings, care must be taken in colder weather that pipes do not freeze.
4. The heating system for the building must be of a large enough capacity that the building can be re-heated in a reasonable length of time. If the building in its existing state has trouble maintaining room temperature in very cold weather, it is not a good candidate for temperature set-back during that time of the year. Normally, starting the furnace about 2 hours before the building is to be occupied will allow enough time for the building to re-heat.
5. Heavy masonry buildings will not cool off as rapidly, nor re-heat as rapidly, as light frame buildings.
6. Window condensation and frost problems are more likely to occur in very cold weather in buildings that use night set-back. However, most commercial buildings in Saskatchewan generally have a low interior humidity level, and condensation problems are not likely.
7. In commercial buildings with mechanical ventilation systems, it is usually possible to turn off or reduce the ventilation system during the set-back period.
8. As with most conservation measures, it is important that a person be identified who will be responsible for implementing the night set-back strategy. It is not a simple task to program some of the set-back thermostats; organizations should allot some time for staff to become familiar with the use of these thermostats.
9. A battery-backed thermostat which retains the programmed set-back information is preferable to one without a battery.
10. A programmable thermostat with a weekly program capability (5days and 2 days, etc) is preferable to a thermostat that has only a daily program. The thermostat with the weekly program will be able to save more energy.

Availability

Programmable thermostats are available from several sources: building supply companies, electrical distributors. Commercial programmable thermostats are available from electrical distributors or electrical control companies.

Reference

Albert Thumann, Handbook of Energy Audits, 3rd Edition, 1991, Fairmont Press, Inc., 700 Indian Trail, Lilburn, GA, USA, 30247

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